Mobile Streaming Media Overlays & Secure Media Delivery Technologies

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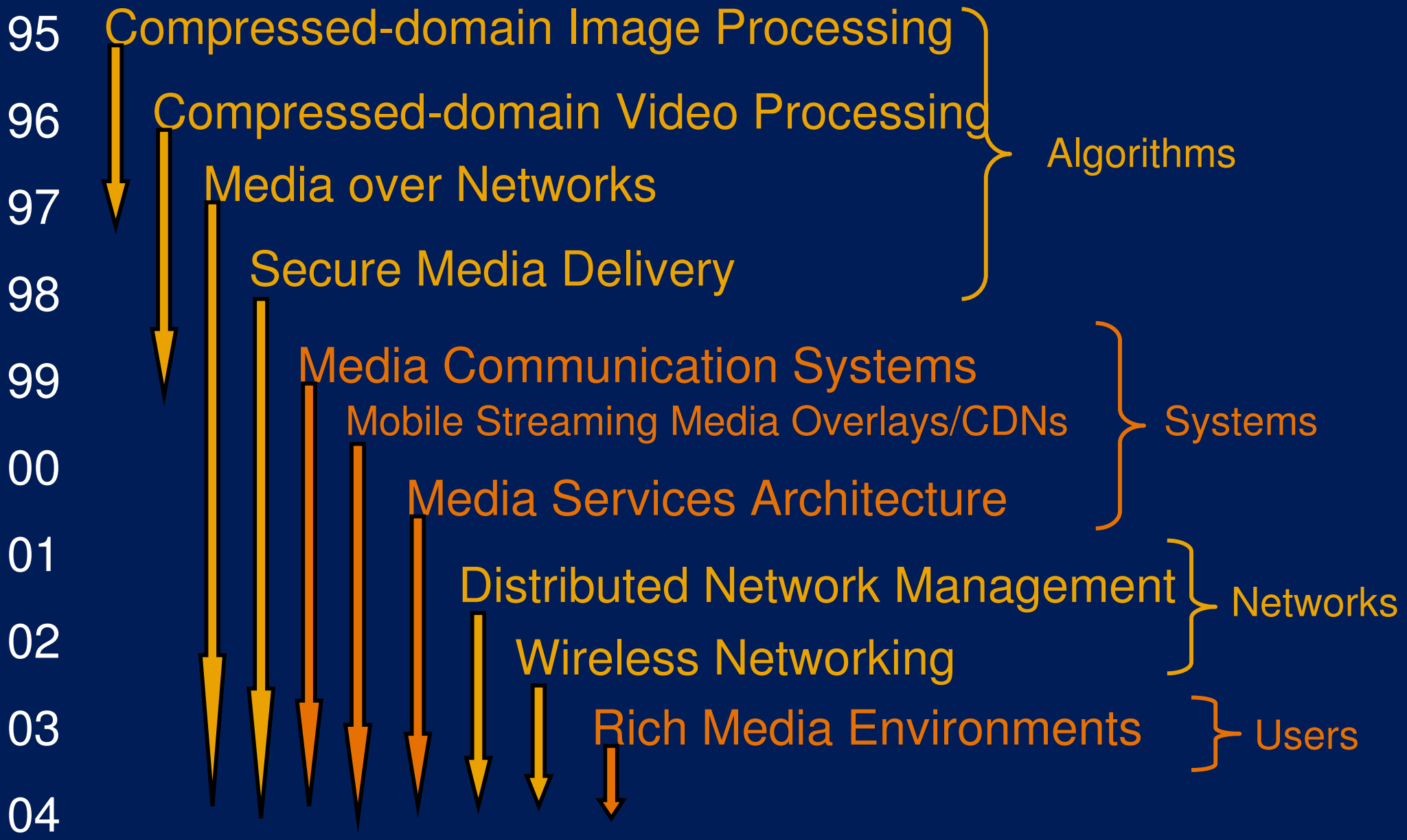
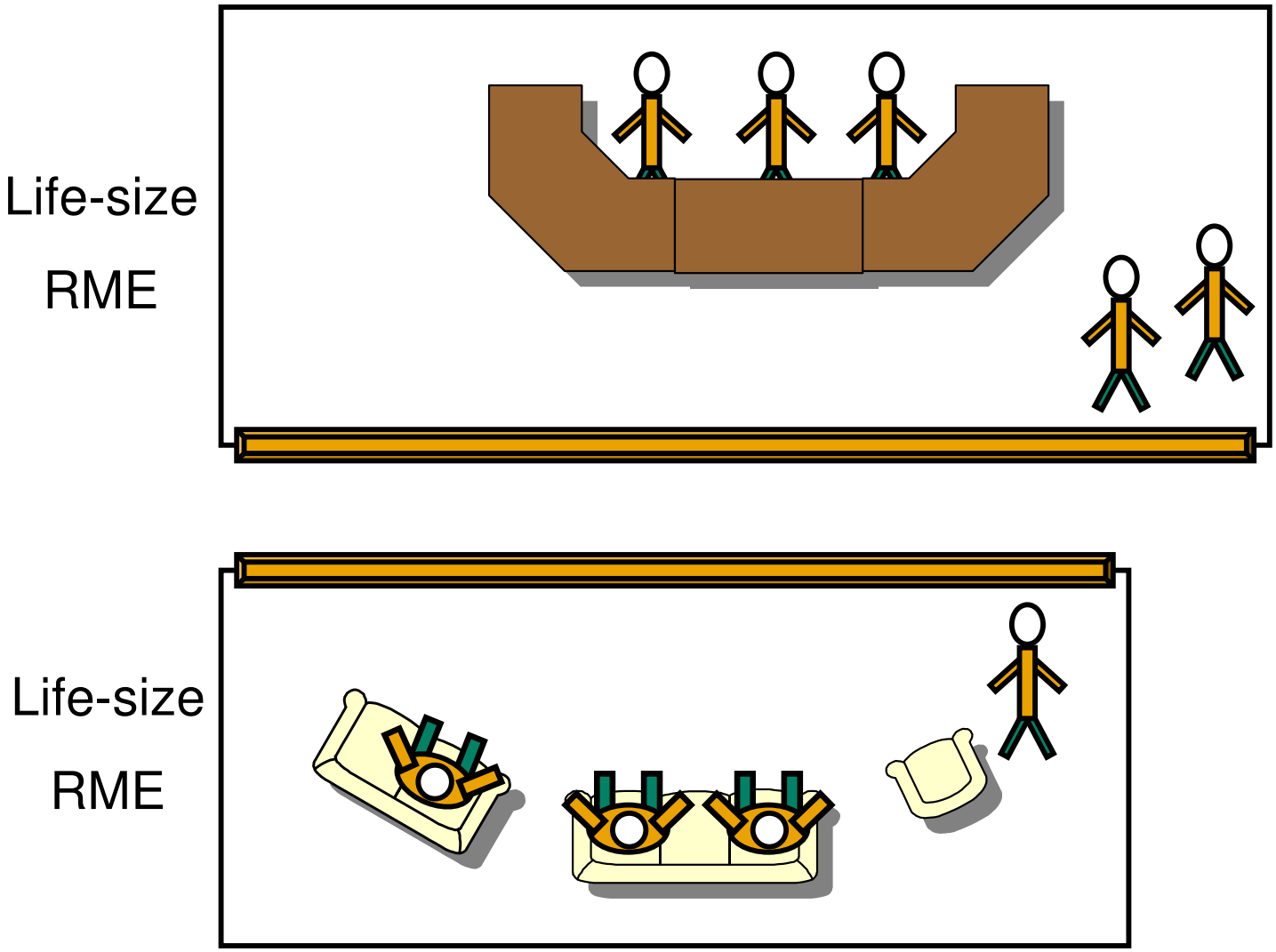
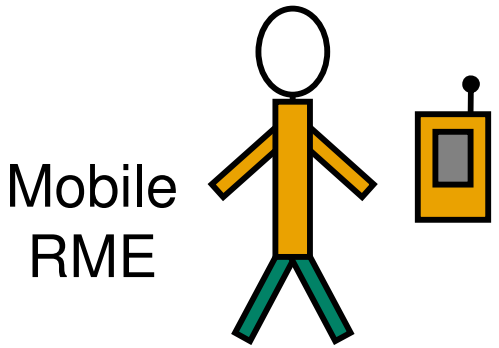
Technology timeline

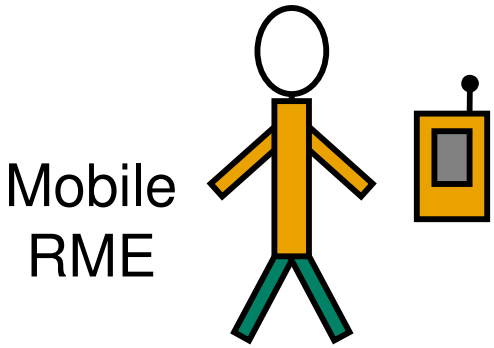


Life-size Rich Media Experience

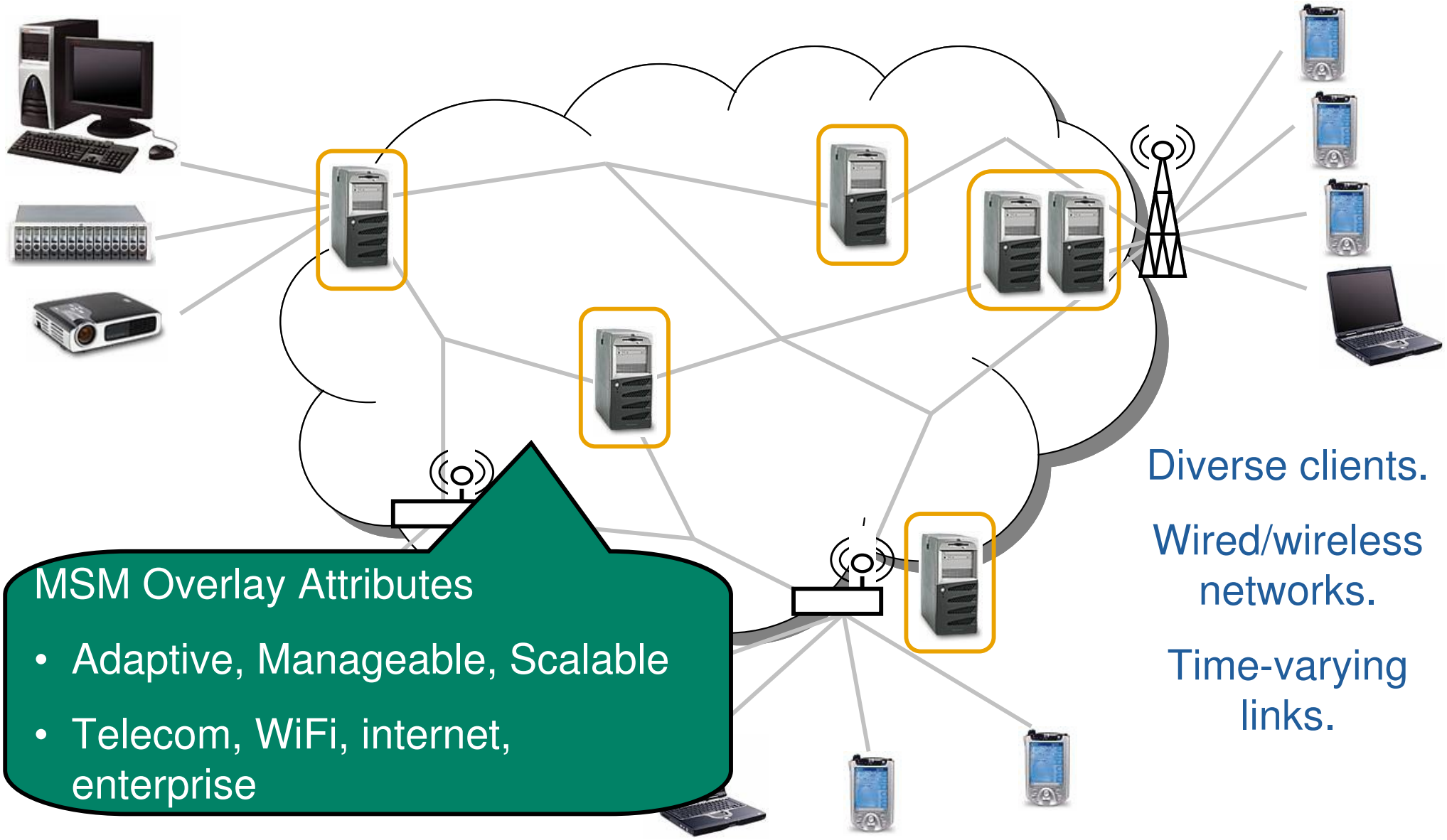
Rich Media Experience (RME)







Mobile Streaming Media (MSM) Overlay



MSM Overlay Attributes

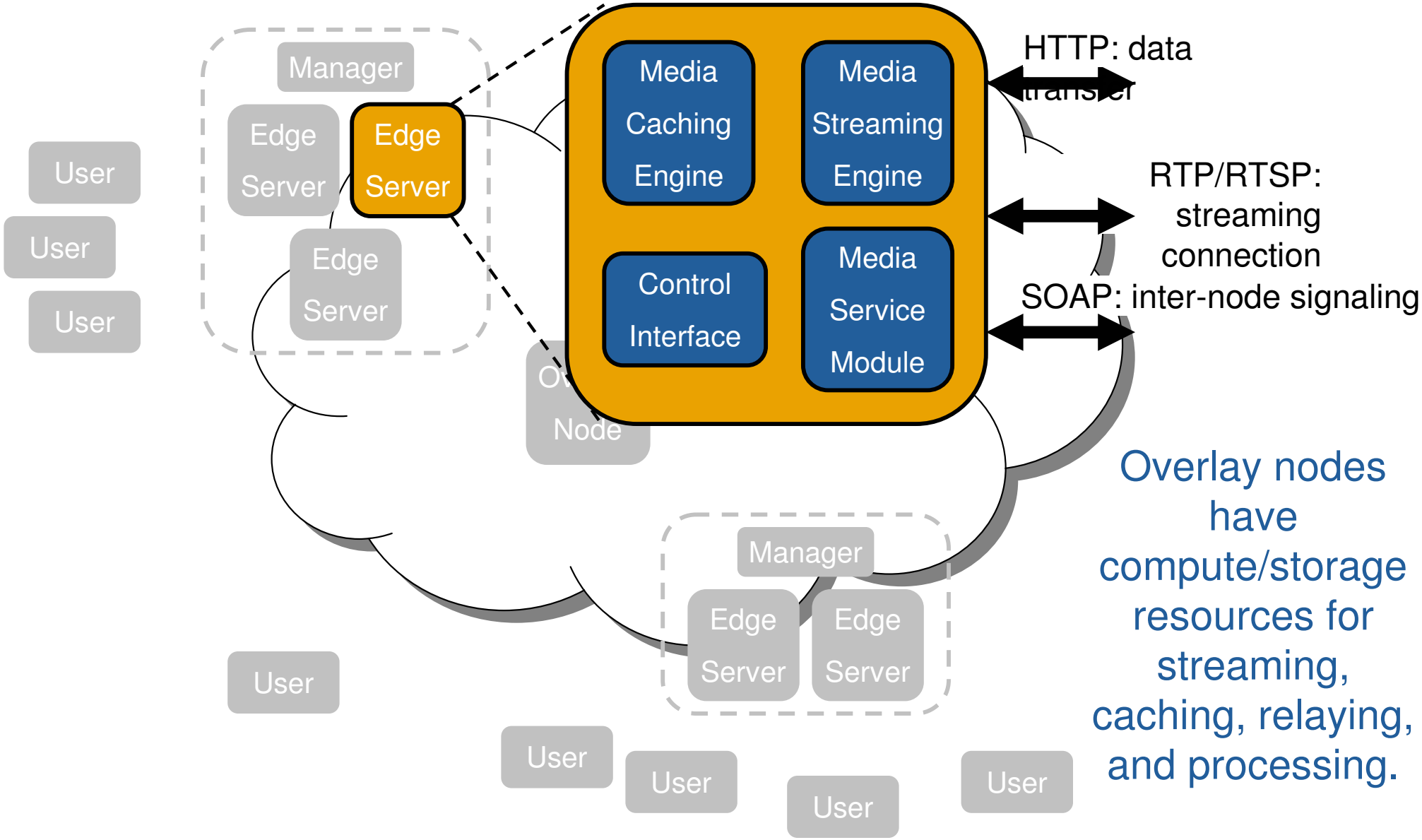
- Adaptive, Manageable, Scalable
- Telecom, WiFi, internet, enterprise

Diverse clients.

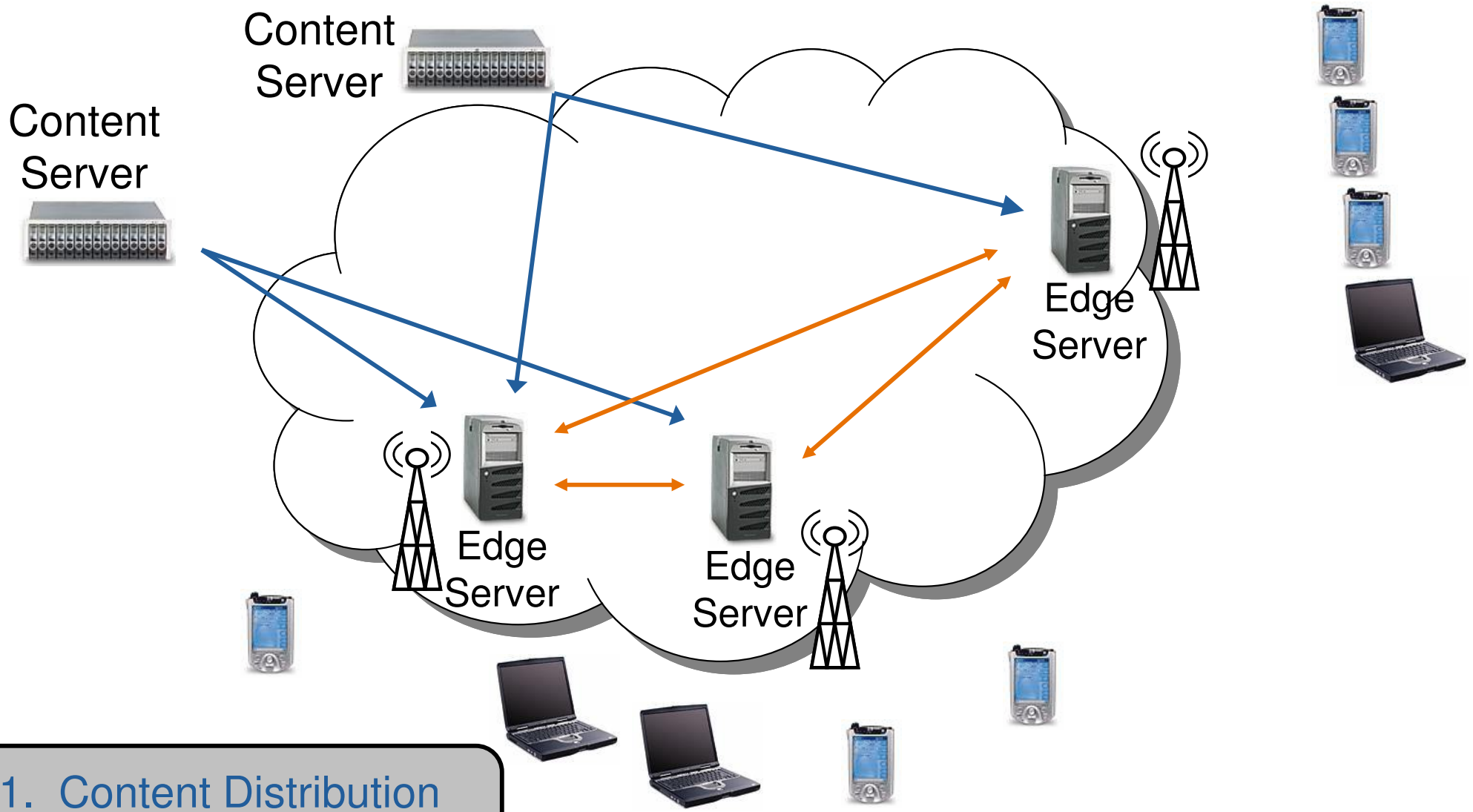
Wired/wireless networks.

Time-varying links.

MSM Overlay: Server architecture

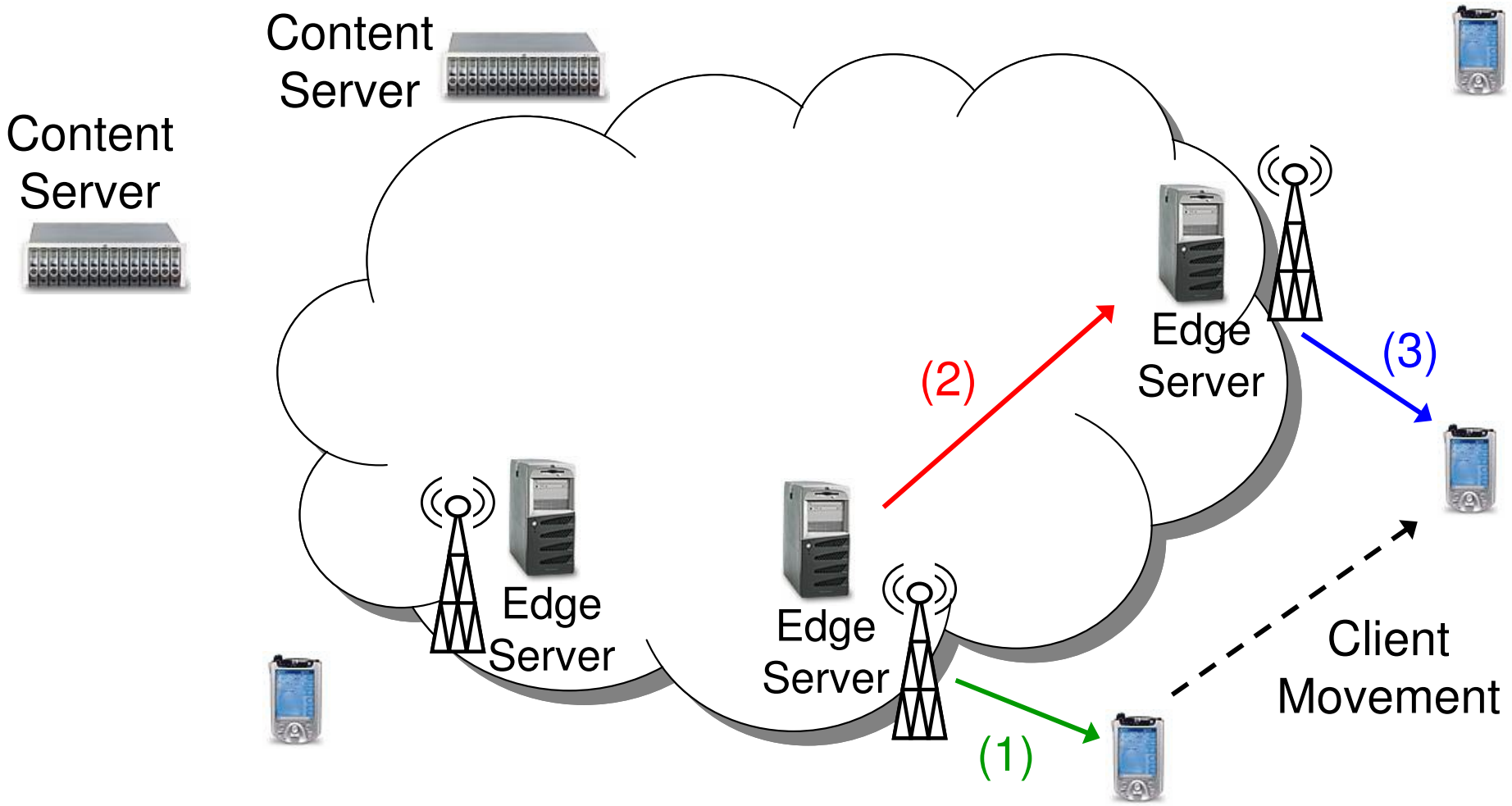


MSM Overlay: Content Distribution

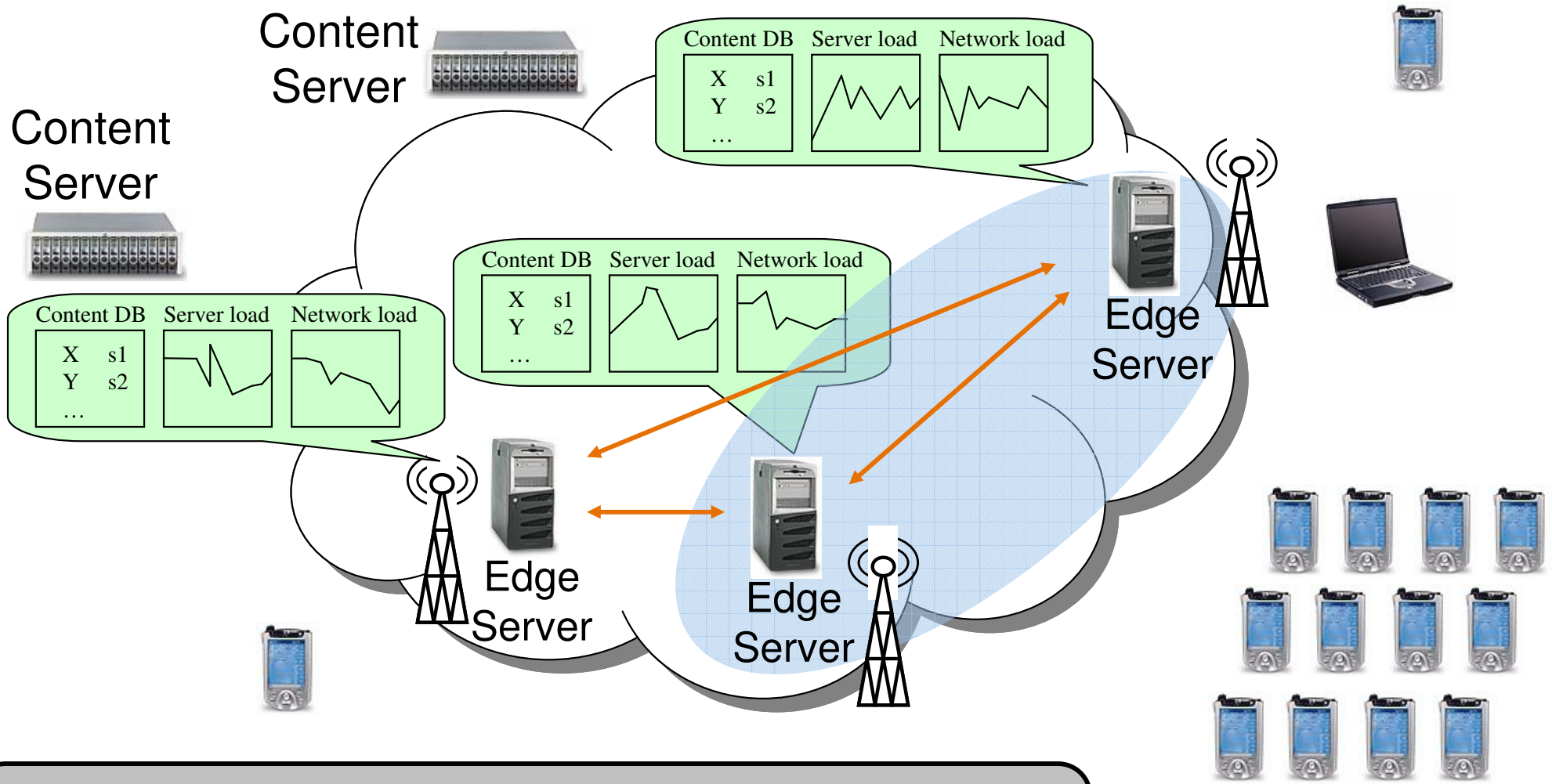


1. Content Distribution
2. Content Redistribution

MSM Overlay: Streaming and Handoffs

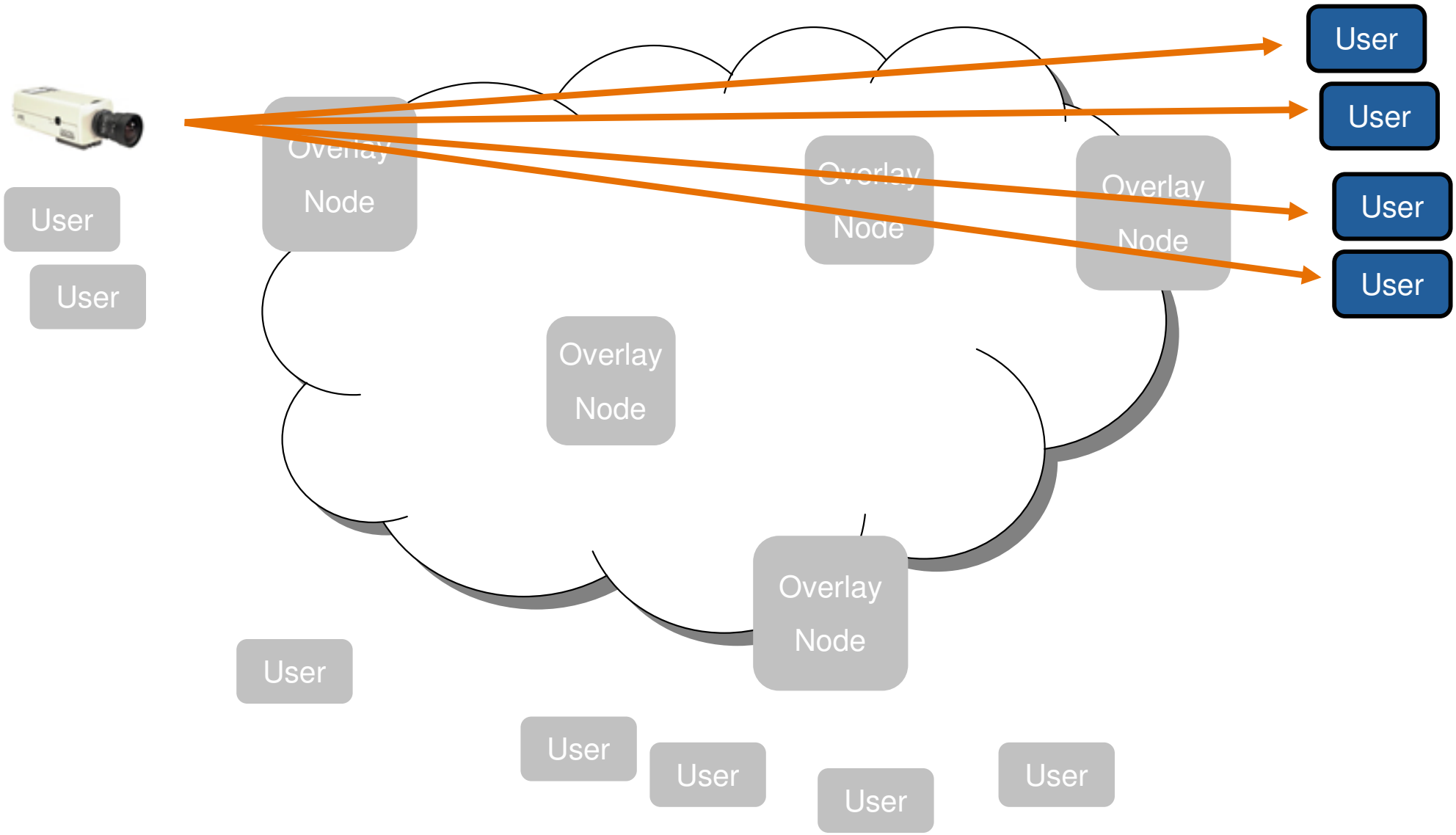


MSM Overlay: Resource Management

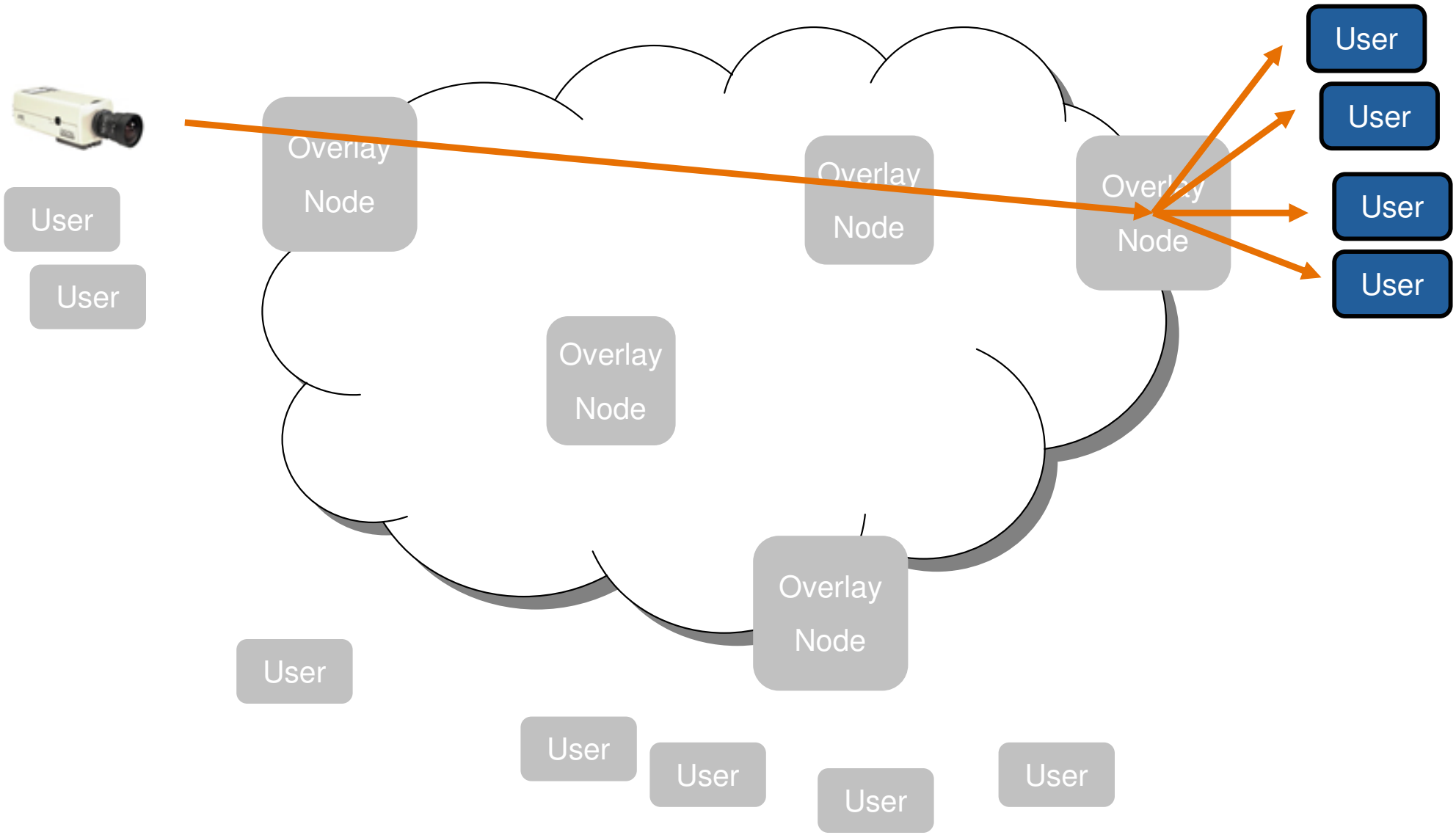


1. Monitor resource usage
2. Collect and analyze logs
3. Optimally allocate resources to handle peak loads

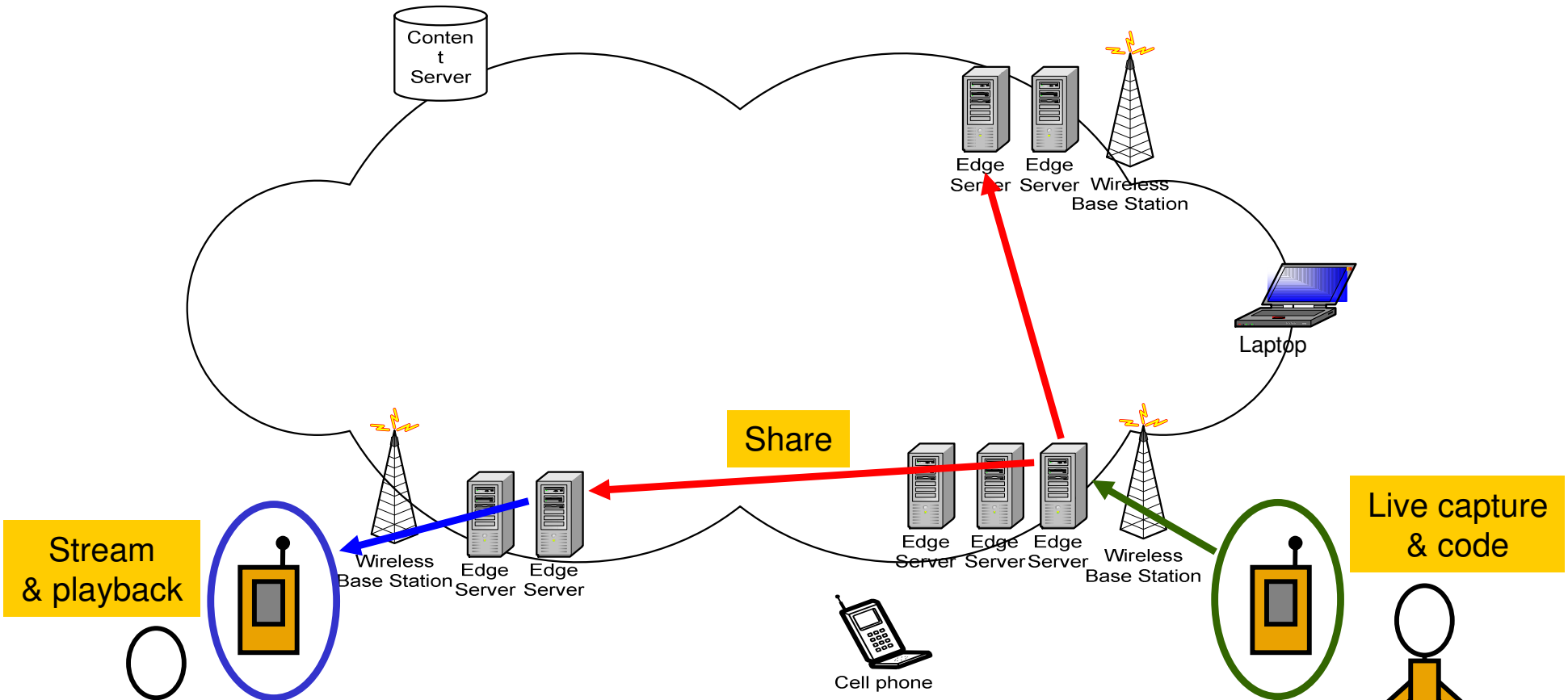
Streaming popular events: Conventional unicast approach



MSM Overlay Capability:
Overlay multicast with stream splitting



MSM Overlay Capability:
Live media upload & sharing on mobile PDAs

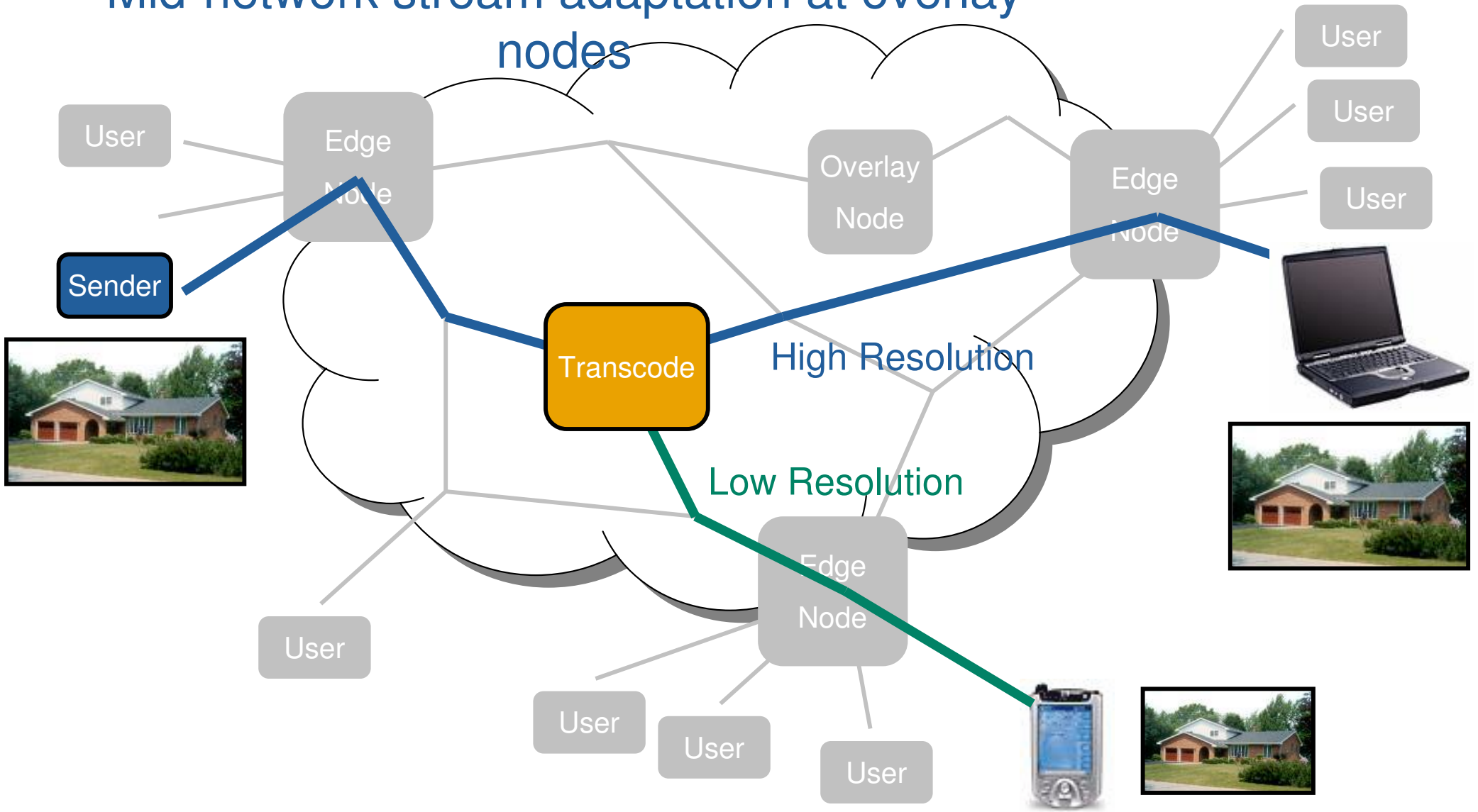


1. Capture & stream live content to a nearby edge server
2. Share/distribute stream with MSM-CDN infrastructure
3. Stream media content to other clients

MSM Overlay Capability:

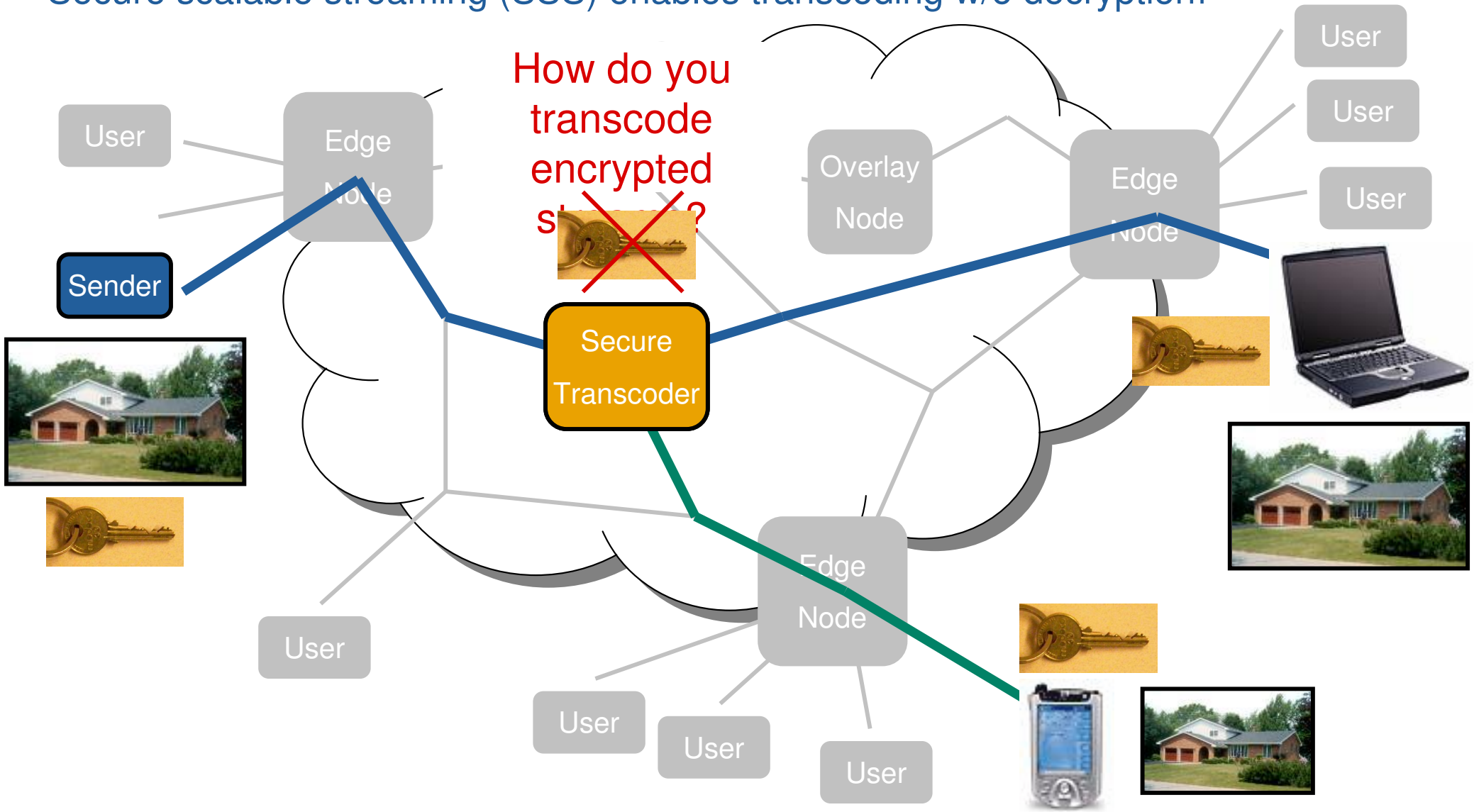
Live network transcoding for diverse clients

Mid-network stream adaptation at overlay nodes

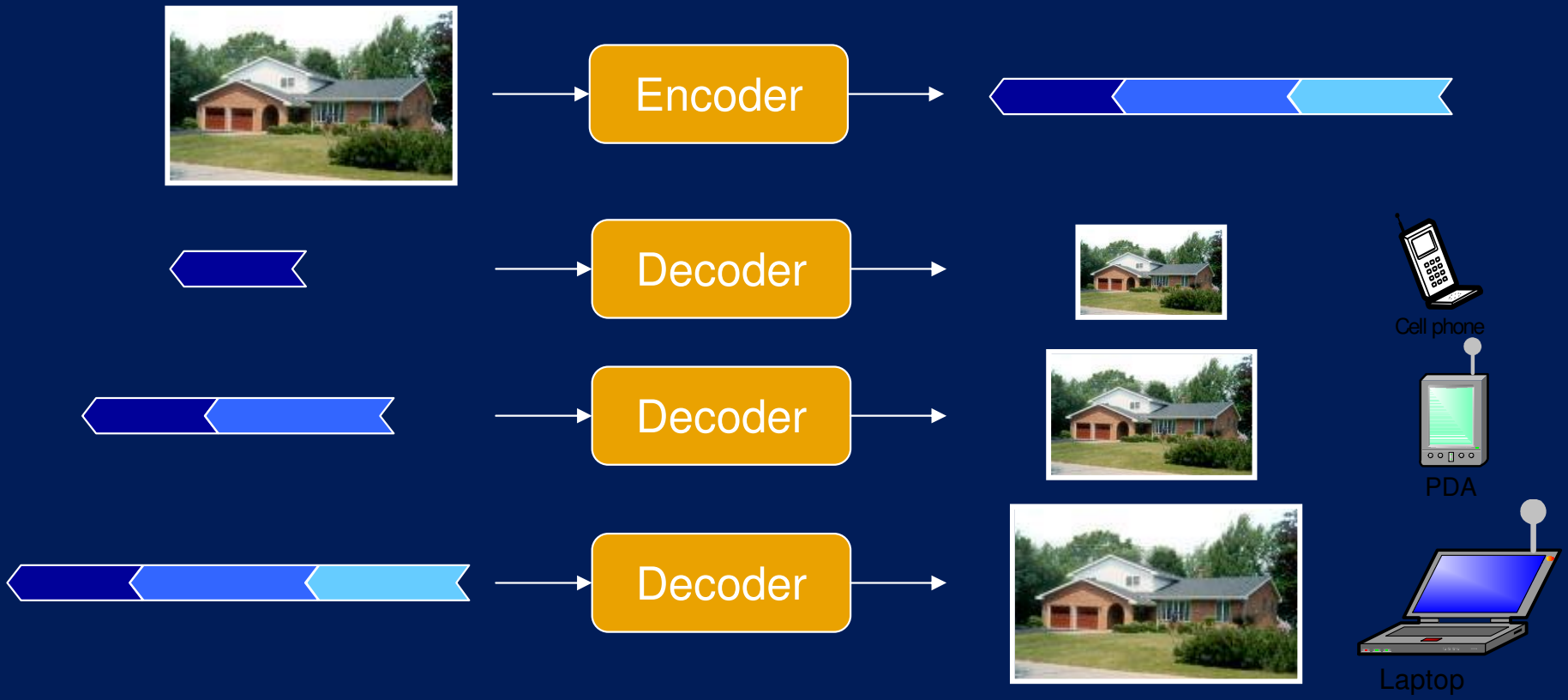


Network Transcoding for Diverse Clients and End-to-End Security

Secure scalable streaming (SSS) enables transcoding w/o decryption!



Scalable coding

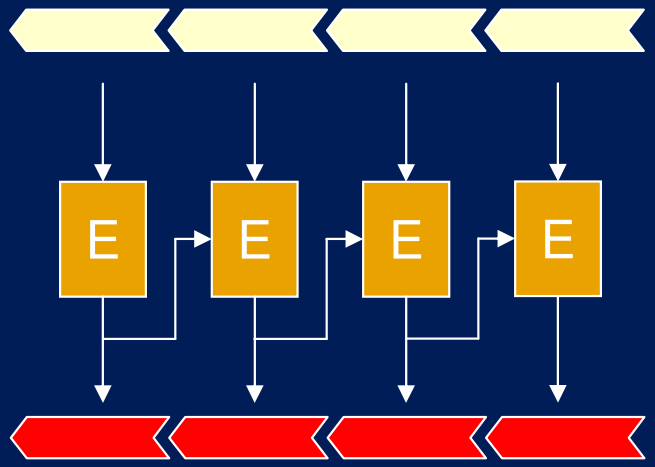


Key features of scalable coding

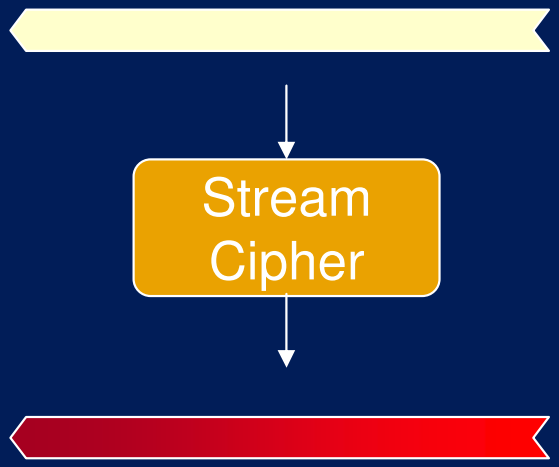
- Embedded bitstream: Quality depends on amount of decoded data
- Only need earlier segments to decode

Progressive encryption

Progressive Encryption: class of algorithms that encrypt data sequentially



Cipher block chains

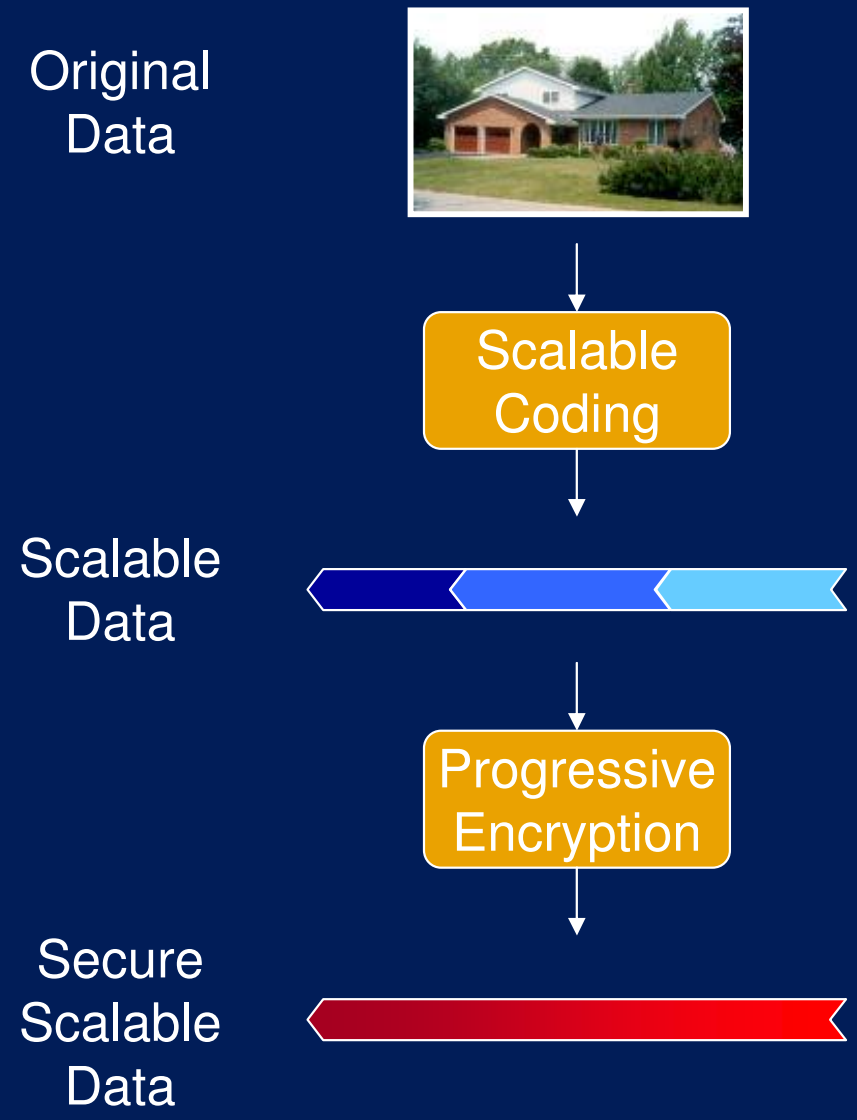


Stream ciphers

Key features of progressive encryption

- Earlier bits fed into later bits
- Only need earlier segments to decrypt

Combining scalable coding and progressive encryption



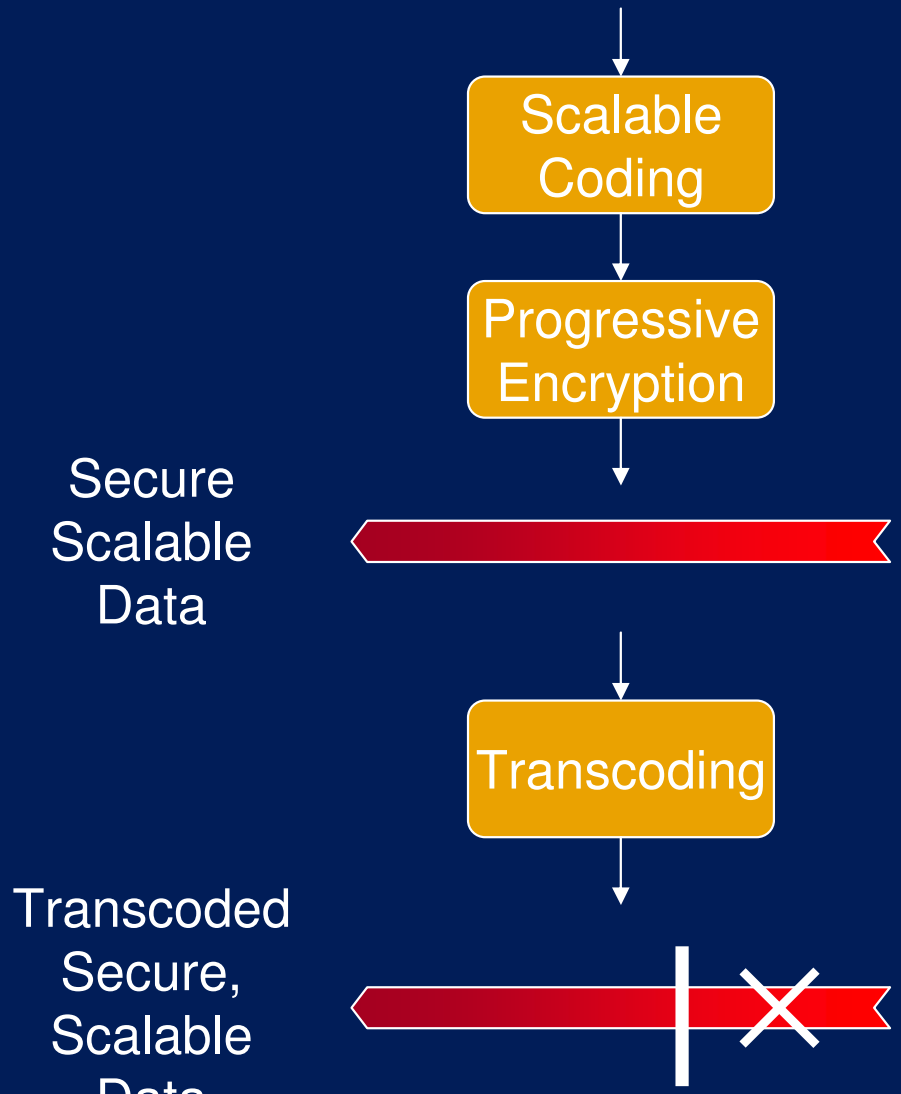
Approach:

- Combine scalable coding & progressive encryption

Result:

- Secure Scalable Data

Secure downstream transcoding



Exploit key features:

- SC: Only need earlier segments to decode
- PE: Only need earlier segments to decrypt

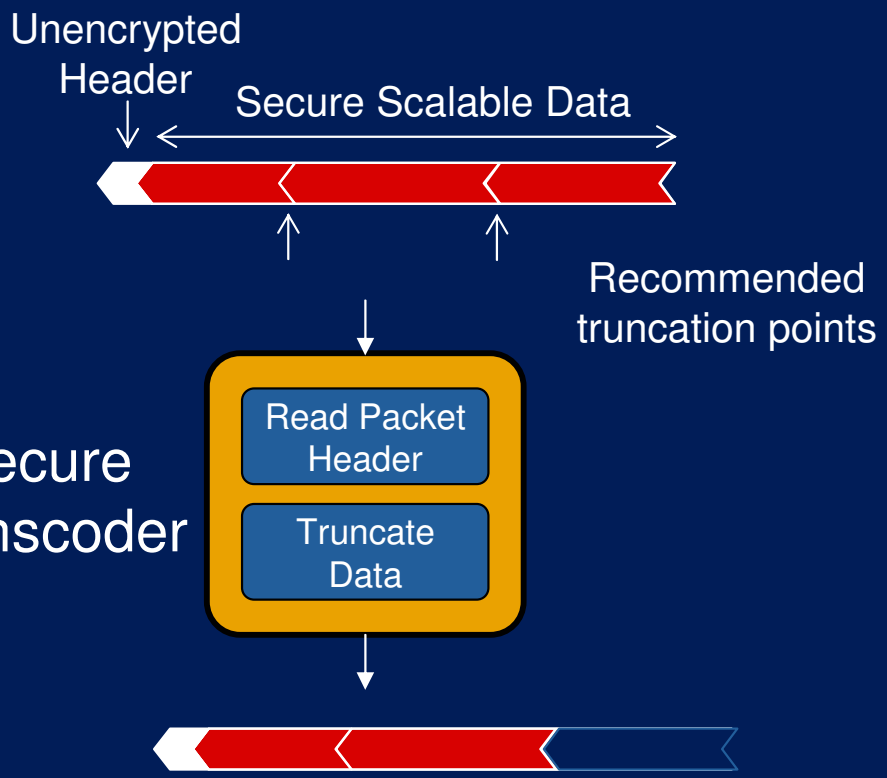
Downstream transcoding by simple packet truncation!

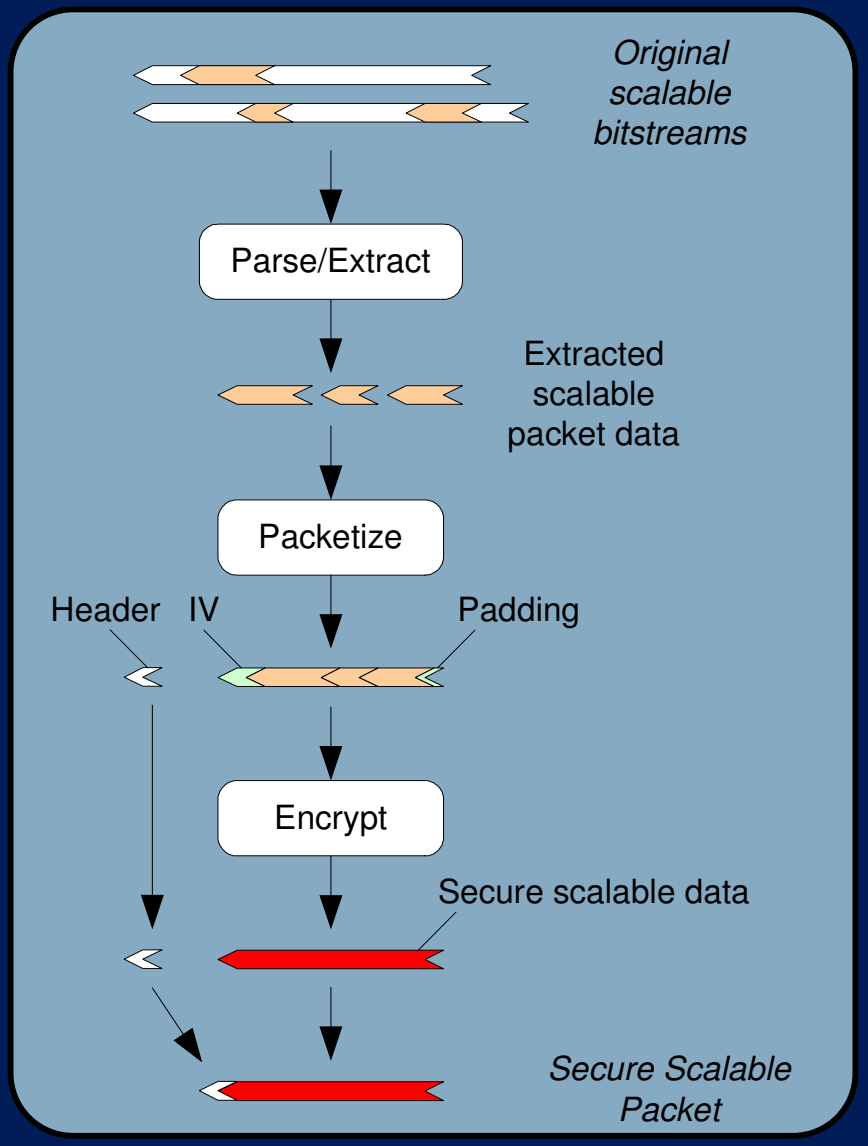
- No decryption
  - Preserves security
- No decoding
  - Low complexity

Secure Scalable Streaming: A detailed view

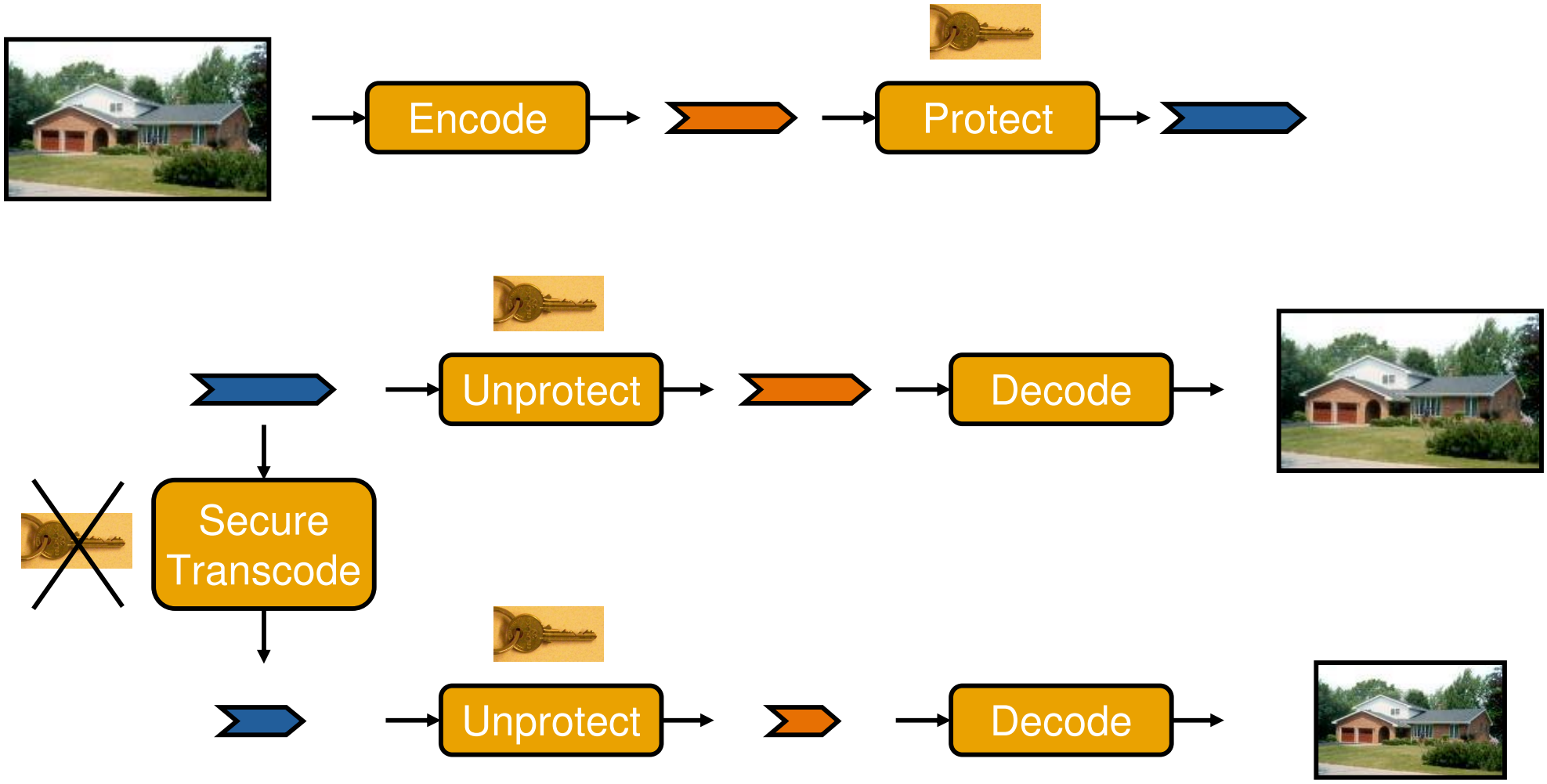
Additional issues arise for packetization

SSS packet format





JPSEC with Secure Transcoding



Results: SSS transcoded images (JPEG-2000 & AES)

Secure Media Communication

US Government Agency

JPSEC
JPEG-2000 Security Standard

US government agency called us about SSS (July 02)
- MOU for joint SSS development

JPEG-2000 security standard committee called us (Nov 03)
- Joined JPSEC & made SSS contributions
- JPSEC committee draft approved w/ SSS technology (Apr 04)

Technology landscape for 2007

Rich Media Experiences

- Compelling life-size and mobile end-user experiences

Media Delivery Overlays

- Robust media delivery leveraging existing networks

Networked Media Services

- Enhanced media services in media delivery infrastructures

Secure Media Delivery

- End-to-end security *and* mid-network transcoding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invent